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## Dynamics of genetic differentiation in experimental *Drosophila* metapopulations

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# Dynamics of genetic differentiation in experimental *Drosophila* metapopulations

UNRAVELLING THE INTERPLAY OF SELECTION AND MIGRATION

M.W. Smith-Kleefsman

1. Wanneer fenotypische eigenschappen gebruikt worden om genetische divergentie tussen populaties te bepalen, zal dit altijd slechts een benadering van de werkelijke genetische divergentie opleveren.  
*Roff (1997) Evolutionary Quantitative Genetics,*  
*Dit proefschrift, Hoofdstuk 5*
2. Hoewel men ervan uitgaat dat veel moleculaire merkers, zoals microsatellieten, niet onder selectie staan (neutrale merkers), is er geen merker die niet beïnvloed wordt door natuurlijke selectie en dus echt neutraal is.  
*Lewontin (1974) The Genetic Basis of Evolutionary Change*  
*Dit proefschrift, Hoofdstuk 3*
3. De vergelijking van differentiatie tussen populaties voor kwantitatieve kenmerken ( $Q_{ST}$ ) met die voor moleculaire merkers ( $F_{ST}$ ) heeft een beperkte betekenis om conclusies te trekken over de rol van natuurlijke selectie in metapopulaties.  
*Merilä & Crnokrak (2001) Journal of Evolutionary Biology 14:892-903*  
*Dit proefschrift*
4. Wanneer selectie in tegengestelde richting werkt binnen verschillende populaties, wordt gene flow tussen deze populaties tegengewerkt, waardoor er weinig tot geen uitwisseling plaatsvindt tussen deze populaties. Hiervoor wordt veelal de term isolatie-door-adaptatie gebruikt. Isolatie-door-selectie is echter een beter dekkende term voor dit proces.  
*Nosil (2008) Evolution 62:316-336*  
*Dit proefschrift, Hoofdstuk 2,3 en 4*
5. Wanneer velden met genetisch gemodificeerde planten aangeplant worden, is de vraag niet of er uitwisseling gaat plaatsvinden tussen deze planten en hun wilde verwanten, maar wanneer en hoe vaak dit zal gebeuren.  
*Dit proefschrift, Hoofdstuk 6*
6. Experimenten zijn noodzakelijk om theoretische concepten te verbinden met de situatie in de natuur.
7. Hoe groot onze kennis van de natuur ook wordt, de natuur zal ons altijd blijven verrassen.

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UNRAVELLING THE INTERPLAY OF SELECTION AND MIGRATION

M.W. Smith-Kleefsman

1. Assessing genetic divergence on the basis of phenotypic traits cannot provide more than a rough approximation of the actual genetic divergence.  
*Roff (1997) Evolutionary Quantitative Genetics,*  
*This thesis, Chapter 5*
2. Molecular markers, like microsatellites, are usually assumed to be selectively neutral; yet, any marker is subject to one or the other form of selection.  
*Lewontin (1974) The Genetic Basis of Evolutionary Change*  
*This thesis, Chapter 3*
3. The comparison of differentiation among populations for quantitative traits ( $Q_{ST}$ ) and for molecular markers ( $F_{ST}$ ) is of limited use for inferring the presence and characteristics of selection in metapopulations.  
*Merilä & Crnokrak (2001) Journal of Evolutionary Biology 14:892-903*  
*This thesis*
4. In metapopulations with strong local adaptation, immigrants have often low fitness, reducing the effective gene flow between subpopulations and leading to limited genetic exchange. This phenomenon is commonly called 'isolation-by-adaptation,' but 'isolation-by-selection' is a more appropriate term.  
*Nosil (2008) Evolution 62:316-336*  
*This thesis, Chapter 2,3 and 4*
5. Whenever genetically modified crops are planted with wild relatives in their vicinity, the question is not whether these crops will cross with their wild relatives, but when and how often this will happen.  
*This thesis, Chapter 6*
6. Experiments are essential in linking theoretical concepts to natural conditions.
7. Despite the continuously increasing knowledge of our natural environment, nature will always keep surprising us.